

Observations on the Vegetation of the Upper Damodar Catchment Area

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This paper gives an account on the floristic composition of the vegetation of the Upper Damodar Catchment Area as observed by the author during a botanical exploration tour. It also provides a list of plants collected with up-to-date nomenclature.

INTRODUCTION

A preliminary survey was made of the flora of the Upper Damodar Catchment Area during 1951 on behalf of the Damodar Valley Corporation, primarily with a view to select some of the native species for the afforestation programme of the Damodar Valley Corporation. Collections were made from several districts of South Bihar, particularly the whole of Hazaribagh and Manbhum districts.

The altitude ranges from 240 m to 660 m above sea level, and these areas are composed of plateaus and hills, with numerous ravines. Apart from the river Damodar which rises somewhere in Palamau district, and flows over a length 144 km in an eastward direction through Hazaribagh district, other important rivers of this area are Garhi, Haharo, Naikari, Maramarha, Bhera, Konar, Janjo, Jamunia and Barakar which are tributaries of Damodar and Jhikia, Chako, Dhadhar, Tilaya, Sakri, Ajoy and Subarnarekha.

The average annual rainfall is roughly between 112.5 mm and 125 mm with 80% of the total annual rainfall confined to monsoon months of June-September. The hottest months are May and June and coldest months are December and January.

Apart from the scanty literature (Hook. f. in *Journ. Asiat. Soc. Beng.* 17: 356-411, 1848; Anderson *ibid.* 32: 189-218, 1863; Wood in *Rec. Bot. Surv. Ind.* 2: 1-170, 1903; Thomson in *Dist. Gazett. Hazaribagh* (1917) dealing with the plants of the area, there is no recent published account on the flora of the region. Therefore, the results of the explorative tour are presented in the paper.

THE FLORA

In general the vegetation of the area can be classified under monsoon or dry deciduous forest with sal as a dominant tree. The primary

forest is for the greater part either degraded into scrubjungle and savannah or converted into cultivable land. The original forest is confined to ravines, hill-slopes and Reserves of Religera, Serenghatu and Morha Hill. The characteristic trees are *Anogeissus latifolia*, *Buchanania latifolia*, *Dalbergia latifolia*, *Terminalia tomentosa*, *T. chebula*, *T. bellerica*, *Cleistanthus collinus*, *Boswellia serrata*, *Pterocarpus marsupium*, *Antidesma ghaesembilla*, *Ougeinia oogeinensis*, *Semecarpus anacardium*, *Gmelina arborea*, *Wendlandia tinctoria*, *Litsea roxburghii*, *Croton oblongifolius* and *Dolichandrone stipulata* apart from *Shorea robusta*. The shrubby layer is composed of *Holarrhena antidysenterica*, *Buddleja asiatica*, *Canthium parvifolium*, *Woodfordia fruticosa*, *Helicteres isora*, *Grewia hirsuta*, *Desmodium pulchellum*, *Indigofera cassioides*, *Moghania paniculata*, *Ixora undulata*, *Pavetta crassicaulis*, *Mallotus philippensis* and *Petalidium barlerioides*. *Combretum roxburghii*, *Ventilago denticulata*, *Smilax zeylanica*, *Millettia auriculata*, *Abrus precatorius*, *Phanera vahlii* and *Ichnocarpus frutescens* are some of the commonest shrubby climbers. The herbaceous growth was poor at the time the trip was made during post-monsoon season, and is represented by perennial summer herbs like *Hemigraphis latebrosa*, *Lepidagathis incurva*, *Leucas mollissima*, *Nepeta hindostana*, *Vernonia teres*, *V. roxburghii*, *Crotalaria prostrata* and *C. albida*. The commonest herbaceous climber is *Dioscorea bulbifera*.

The vegetation of partially degraded forest and scrub jungle is composed of small often stunted trees like *Schleichera oleosa*, *Lannea coromandelica*, *Syzygium cumini*, *Casearia elliptica*, *Cochlospermum religiosum*, *Kydia calycina*, *Aegle marmelos*, *Butea monosperma*, *Erythrina variegata*, *Piliostigma malabaricum*, *Lagerstroemia parviflora*, *Cassia fistula*, *Madhuca indica*, *Diospyros malabarica*, *Mallotus philippensis*, *Phyllanthus emblica* and *Nyctanthes arbor-tristis*. Some of the commonest shrubs are *Xeromphis spinosa*, *X. uliginosa*, *Gardenia latifolia*, *Canthium parviflorum*, *Flacourtia indica*, *Azanza lampas*, *Maytenus bailadillana*, *Zizyphus mauritiana*, *Z. xylopyra*, *Desmodium pulchellum*, *Indigofera cassioides*, *Phanera retusa*, *Acacia farnesiana*, *Mimosa rubicaulis*, *Woodfordia fruticosa*, *Carissa spinarum*, *Eranthemum purpurascens*, *Perilepta auriculata*, *Lantana camara*, *Colebrookea oppositifolia*, *Pogostemon benghalense* and *Antidesma diandrum*. Shrubby climbers are represented by *Cryptolepis buchanani*, *Ichnocarpus frutescens*, *Combretum roxburghii*, *Ventilago denticulata* and *Porana paniculata*. The herbaceous growth is more or less similar to the ground flora of the original forest but with several grasses like *Capillipedeum assimile*, *Cymbopogon schoenanthus*, *C. jwarancusa*, *Heteropogon contortus* and *Thysanolaena maxima*. One of the peculiar features of this habitat is the presence of dwarf palm *Phoenix acaulis* and the occurrence of *Dendrocalamus strictus* in gregarious clumps.

Scattered over the savannah and near habitational sites are trees like *Shorea robusta*, *Bombax ceiba*, *Azadirachta indica*, *Sapindus laurifolius*, *Butea monosperma*, *Ailanthus excelsa*, *Tamarindus indicus*, *Madhuca indica*, *Diospyros malabarica*, *Schrebera swietenioides*, *Cassia fistula*, *Holoptelea integrifolia*, *Ficus benghalensis*, *F. racemosa* and *F. religiosa* and shrubs like *Zizyphus mauritiana*, *Carissa spinarum*, *Calotropis gigantea* and *Flacourtia indica*. The herbaceous flora is represented by *Hybanthus enneaspermus*, *Portulaca quadrifida*, *Malvastrum coromandelianum*, *Alysicarpus monilifer*, *Desmodium gangeticum*, *D. triflorum*, *Borreria articularis*, *Hedyotis hispida*, *Ageratum conyzoides*, *Blumea lacera*, *Glossogyne bidens*, *Launaea fallax*, *Tridax procumbens*, *Vernonia cinerea*, *Evolvulus alsinoides*, *Anisomeles indica*, *Boerhaavia diffusa*, *Euphorbia hirta*, *E. thymifolia*, *Cyperus rotundus*, *Bothriochloa intermedia*, *Cynodon dactylon*, *Eragrostis tenella* and *Imperata cylindrica*.

Tamarix ericoides and *Bombax ceiba* are common along river beds, while *Salix tetrasperma* and *Homonium riparia*, constitute rheophytic vegetation. Exotic weeds like *Lantana camara* and *Argemone mexicana* often form gregarious clumps on stabilised riverine islands. *Phyllanthus nodiflorus*, *Eragrostis coarctata* and *Polygonum plebejum* are the commonest herbs of sandy river beds.

Hydrophytic vegetation of stagnant waters, ditches and ponds is represented by species like *Najas marina*, *Lemna perpusilla*, *Potamogeton indicus* and *P. nodosus*. *Hygrophila auriculata*, *H. polysperma*, *Bacopa monnieri*, *Limnophila rugosa*, *Panicum repens* and *Phragmites karka* constitute the vegetation of the marshy and swampy localities. The margins of these watery localities are inhabited by *Polygonum glabrum*, *Cyathocline purpurea* and *Cyperus* sp.

Epiphytes are represented by *Rhynchosstylis retusa* and *Vanda parviflora*.

Cuscuta reflexa is a sole representative of total stem-parasites, while *Dendrophthoe falcata* and *Viscum nepalense* represent partial stem-parasites.

Some of the exotic weeds that are established and naturalized in this area are *Argemone mexicana*, *Crotalaria mucronata*, *Malvastrum coromandelianum*, *Ageratum conyzoides*, *Tridax procumbens*, *Solanum torvum* and *Lantana camara*.

Azadirachta indica, *Tamarindus indica*, *Mangifera indica*, *Millingtonia hortensis*, *Cassia siamea*, *Albizia lebbek*, *Grevillea robusta*, *Pongamia pinnata*, *Eucalyptus* sp., *Tectona grandis* and *Pterospermum acerifolium* are some of the common road-side trees.

Agricultural crops of the area are *Triticum aestivum*, *Cajanus cajan*, *Pennisetum typhoides*, *Cicer arietinum*, *Linum usitatissimum*, *Carthamus tinctorius*, *Oryza sativa*, *Zea mays* and *Pisum sativum*.

LIST OF SPECIES

SELAGINELLACEAE

Selaginella flaccida Spring.

EQUISETACEAE

Equisetum debile Roxb.

SCHIZAEACEAE

Lygodium flexuosum (Linn.) Sw.

PTERIDACEAE

Adiantum philippense Linn.*Aleuritopteris farinosa* (Forsk.) Fee*Pteris vittata* Linn.

ASPLENIACEAE

Diplazium esculentum (Linn.) Sw.

POLYPODIACEAE

Polypodium proliferum Roxb.

ANGIOSPERMS

PAPAVERACEAE

Argemone mexicana Linn.

VIOLACEAE

Hybanthus enneaspermus (Linn.)
F. V. Muell

COCHLOSPERMACEAE

Cochlospermum religiosum (Linn.)
Alst.

FLACOURTIACEAE

Casearia elliptica Willd.*Flacourtia indica* (Burm. f.) Merr.

PORTULACACEAE

Portulaca oleracea Linn.*P. quadrifida* Linn.

TAMARICACEAE

Tamarix ericoides Rottl.

DIPTEROCARPACEAE

Shorea robusta Gaertn.

MALVACEAE

Azanza lampas (Cav.) Alef.*Kydia calycina* Roxb.*Malvastrum coromandelianum*
(Linn.) Garcke*Urena lobata* Linn.

BOMBACACEAE

Bombax ceiba Linn.

STERCULIACEAE

Eriolaena hookeriana Wt. & Arn.*Helicteres isora* Linn.

TILIACEAE

Grewia hirsuta Vahl

MALPIGHIACEAE

Hiptage benghalensis (Linn.) Kurz

RUTACEAE

Aegle marmelos (Linn.) Corr.

SIMAROUBACEAE

Ailanthus excelsa Roxb.

BURSERACEAE

Boswellia serrata Roxb.*Bursera serrata* Colebr.

MELIACEAE

Azadirachta indica A. Juss.*Soymida febrifuga* A. Juss.*Toona ciliata* Roem.

OLACACEAE

Olax scandens Roxb.

CELASTRACEAE

- Maytenus bailadillana* (Narayan & Mooney) Raju & Babu
Celastrus paniculata Willd.

RHAMNACEAE

- Ventilago denticulata* Willd.
Zizyphus mauritiana Lamk.
Z. xylopyra Willd.
Z. oenoplia Mill.

VITACEAE

- Ampelocissus latifolia* (Roxb.) Planch.

SAPINDACEAE

- Cardiospermum halicacabum* Linn.
Sapindus laurifolius Vahl
Schleichera oleosa (Lour.) Oken

ANACARDIACEAE

- Buchanania latifolia* Roxb.
Lannea coromandelica (Houtt.) Merr.
Semecarpus anacardium Linn. f.

FABACEAE

- Abrus precatorius* Linn.
Alysicarpus monilifer DC.
A. vaginalis (Linn.) DC.
Butea monosperma (Lamk.) Taub.
B. superba Roxb.
Crotalaria albida Heyne ex Roth
C. mucronata Desv.
C. prostrata Rottb. ex Willd.
Dalbergia latifolia Roxb.
D. sissoo Roxb.
Desmodium gangeticum (Linn.) DC.
D. pulchellum Benth.
D. triflorum (Linn.) DC.
Erythrina variegata Linn.
Indigofera cassioides Rottl.
I. linifolia Retz.

Millettia auriculata Baker ex Brandis

Moghania paniculata (Wall.) Li
Ougeinia oogeinensis (Roxb.)

Hoehr.

Pongamia pinnata (Linn.) Pierre
Pterocarpus marsupium Roxb.
Uraria rufescens (DC.) Schindl.

CAESALPINIACEAE

- Bauhinia purpurea* Linn.
Cassia fistula Linn.
Phanera retusa (Buch.-Ham. ex Roxb.) Benth.
P. vahlII (Wt. & Arn.) Benth.
Piliostigma malabaricum (Roxb.) Benth.
Tamarindus indicus Linn.

MIMOSACEAE

- Acacia catechu* Willd.
A. farnesiana Willd.
A. polyacantha Willd.
Albizia lebbek (Linn.) Benth.
A. odoratissima (Linn. f.) Benth.
Mimosa rubicaulis Lamk.

DROSERACEAE

Drosera burmanni Vahl

COMBRETACEAE

- Anogeissus latifolia* (Roxb.) Bedd.
Combretum roxburghii Spreng.
Terminalia bellerica (Gaertn.) Roxb.
T. chebula Retz.
T. tomentosa Bedd.

MYRTACEAE

- Psidium guajava* Linn.
Syzygium heyneanum (Duthie) Gamble
S. cumini (Linn.) Skeels

BARRINGTONIACEAE

Careya arborea Roxb.

LYTHRACEAE

- Lagerstroemia parviflora* Roxb.
Woodfordia fruticosa (Linn.) Kurz

APIACEAE

- Centella asiatica* (Linn.) Urban

ALANGIACEAE

- Alangium salvifolium* (Linn.f.)
 Wangerin

RUBIACEAE

- Adina cordifolia* (Roxb.) Hook.f.
 ex Brandis
Borreria articularis (Linn.f.) F. N.
 Willd.
Canthium parvifolium Roxb.
Gardenia latifolia Ait.
Hedyotis hispida Retz.
Ixora undulata Roxb.
Pavetta crassicaulis Bremek.
Wendlandia heynei (R. & S.) Sant.
 & Merch.
W. tinctoria (Roxb.) DC.
Xeromphis spinosa (Thunb.) Keay
X. uliginosa (Retz.) Mahesh.

ASTERACEAE

- Ageratum conyzoides* Linn.
Blumea fistulosa (Roxb.) Kurz
B. lacera DC.
Cyathocline purpurea (D. Don)
 O.K.
Glossogyne bidens (Retz.) Alston
Launaea acaulis (Roxb.) Babcock
 ex Craib
L. fallax (Jaub. & Spach.) O.K.
Sphaeranthus indicus Linn.
Tridax procumbens Linn.
Vernonia cinerea (Linn.) Less.
V. roxburghii Less.
V. teres Wall. ex DC.

MYRSINACEAE

- Embelia tsjeriam-cottam* DC.

SAPOTACEAE

- Madhuca indica* Gmel.

EBENACEAE

- Diospyros malabarica* (Desr.) Kostel.

SYMPLOCACEAE

- Symplocos racemosa* Roxb.

OLEACEAE

- Jasminum arborescens* Roxb.
Nyctanthes arbor-tristis Linn.
Schrebera swietenoides Roxb.

APOCYNACEAE

- Carissa spinarum* Linn.
Holarrhena antidysenterica (Roth)
 DC.
Ichnocarpus frutescens (Linn.) R.Br.

ASCLEPIADACEAE

- Calotropis gigantea* (Willd.) Dryand.
 ex Ait.f.
Cryptolepis buchanani R. & S.
Hemidesmus indicus Schult.

LOGANIACEAE

- Buddleja asiatica* Lour.
Cynoctonum mitreola (Linn.) Britt.

GENTIANACEAE

- Canscora diffusa* (Vahl) R. Br. ex
 Wall.
Exacum pedunculatum Linn.
Hopea dichotoma Willd.

BORAGINACEAE

- Cordia dichotoma* Forst.f.
Trichodesma indicum R.Br.

CONVOLVULACEAE

- Cuscuta reflexa* Roxb.
Evolvulus alsinoides (Linn.) Linn.
E. nummularius (Linn.) Linn.
Merremia quinata (R.Br.) Ooststr.

Operculina petaloidea (Choisy)
Ooststr.

Porana paniculata Roxb.

Rivea hypocrateriformis Choisy

SOLANACEAE

Solanum indicum Linn.

S. torvum Sw.

SCROPHULARIACEAE

Bacopa monnieri (Linn.) Penn.

Linnophila rugosa (Roth) Merr.

BIGNONIACEAE

Dolichandrone stipulata (Roth)
Benth.

ACANTHACEAE

Andrographis paniculata (Burm.f.)
Nees

Barleria cristata Linn.

B. strigosa Willd.

Eranthemum purpurascens Nees

Hygrophila auriculata (Schum.)
Heine

H. polysperma (Roxb.) T. And.

Hemigraphis latebrosa Nees

Justicia betonica Linn.

Lepidagathis incurva D. Don

Perilepta auriculata (Nees) Brem.

Petalidium barlerioides (Roth) Nees

Rungia parviflora Nees

VERBENACEAE

Clerodendrum viscosum Vent.

Gmelina arborea Roxb.

Lantana camara Linn.

Phyla nodiflora (Linn.) Green

Tectona grandis Linn.f.

Vitex negundo Linn.

LAMIACEAE

Anisomeles indica (Linn.) O.K.

Colebrookea oppositifolia Sm.

Leucas mollissima Wall.

L. linifolia Spreng.

Nepeta hindostana (Roth) Haines

Ocimum basilicum Linn.

O. gratissimum Linn.

Pogostemon benghalense (Burm. f.)
O.K.

P. purpurascens Dalz.

NYCTAGINACEAE

Boerhaavia diffusa Linn.

POLYGONACEAE

Polygonum glabrum Willd.

P. plebejum R. Br.

ARISTOLOCHIACEAE

Aristolochia indica Linn.

LAURACEAE

Litsea monopetala (Roxb.) Pers.

L. roxburghii (Nees) Hassk. ex
Back.

LORANTHACEAE

Dendrophthoe falcata (Linn.f.)
Etting.

Viscum nepalense Spreng.

EUPHORBIACEAE

Antidesma diandrum (Roxb.) Roth

A. ghaesembilla Gaertn.

Breynia rhamnoides (Retz.) Muell.-
Arg.

Cleistanthus collinus (Roxb.) Benth.

Croton oblongifolius Roxb.

Euphorbia hirta Linn.

E. thymifolia Linn.

Jatropha curcas Linn.

Homonoia riparia Lour.

Mallotus philippensis (Lamk.)
Muell.-Arg.

Phyllanthus emblica Linn.

P. reticulatus Poir.

Sebastiania chamaelea (Linn.)
Muell.-Arg.

- ULMACEAE
Holoptelea integrifolia (Roxb.)
 Planch.
- MORACEAE
Ficus benghalensis Linn.
F. racemosa Linn.
F. religiosa Linn.
F. virens Ait.
- SALICACEAE
Salix tetrasperma Roxb.
- ORCHIDACEAE
Rhynchosstylis retusa Bl.
Vanda parviflora Lindl.
- AMARYLLIDACEAE
Crinum asiaticum Linn.
- AGAVEACEAE
Agave vera-cruz Mill.
- DIOSCOREACEAE
Dioscorea bulbifera Linn.
- LILIACEAE
Asparagus racemosus Willd.
Gloriosa superba Linn.
- COMMELINACEAE
Commelina benghalensis Linn.
C. hasskarlii Cl.
- ARECACEAE
Borassus flabellifer Linn.
Phoenix acaulis Buch.-Ham. ex
 Roxb.
- LEMNACEAE
Lemna perpusilla Torrey
- NAJADACEAE
Najas marina Linn.
- POTAMOGETONACEAE
Potamogeton indicus Roxb.
P. nodosus Poir.
- CYPERACEAE
Cyperus rotundus Linn.
Fimbristylis bisumbellata (Forsk.)
 Bulb.
F. cymosa R.Br.
- POACEAE
Arundo donax Linn.
Bothriochloa intermedia (R.Br.) A.
 Camus
Capillipedium assimile (Steud.) A.
 Camus
Chrysopogon aciculatus (Retz.) Trin.
Cymbopogon jwarancusa (Jones)
 Schult.
C. schoenanthus (Linn.) Spreng.
Cynodon dactylon (Linn.) Pers.
Dendrocalamus strictus Nees
Dichanthium annulatum (Forsk.)
 Stapf
Digitaria adscendens (H.B.K.) Henr.
Eragrostis coarctata Stapf ex
 Hook. f.
E. tenella (Linn.) P. Beauv. ex
 R. & S.
Heteropogon contortus (Linn.) P.
 Beauv. ex R. & S.
Imperata cylindrica (Linn.) P.
 Beauv.
Panicum repens Linn.
Phragmites karka (Retz.) Trin,

Rottboellia exaltata Linn.f. **Thysanolaena maxima** (Roxb.) O.K.
Sporobolus diandra (Retz.) P. Beauv. **Vetiveria zizanioides** (Linn.) Nash.

ACKNOWLEDGEMENT

The author wishes to express his appreciation to Dr. S. K. Mukherjee, Keeper, Central National Herbarium for his kind help in the identification of some of the plants.